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10/601,151	06/20/2003	Achintya K. Bhowmik	ITL.0982US (P16217)	7131

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EXAMINER

LEPISTO, RYAN A

ART UNIT PAPER NUMBER

2883

DATE MAILED: 04/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

10/601,151

Applicant(s)

BHOWMIK ET AL.

Examiner

Ryan Lepisto

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 March 2005.
 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17, 19-29 and 32-35 is/are pending in the application.
 4a) Of the above claim(s) 17, 19-21 is/are withdrawn from consideration.
 5) ☒ Claim(s) 17-21 and 33 is/are allowed.
 6) ☒ Claim(s) 1, 2, 6-8, 10-14, 22 and 26-29 is/are rejected.
 7) ☒ Claim(s) 3-5, 9, 15, 16, 23-25, 32, 34 and 35 is/are objected to.
 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
 10) ☒ The drawing(s) filed on 20 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date _____.
 4) ☐ Interview Summary (PTO-413)
 Paper No(s)/Mail Date _____.
 5) ☐ Notice of Informal Patent Application (PTO-152)
 6) ☐ Other: _____.

RM
 4/6/05

DETAILED ACTION

Claim Objections

1. **Claims 34 and 35** are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The limitations of these claims has been placed in claim 33, therefore these claims should be cancelled or additional limitations should be added.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. **Claims 1-2, 6, 8, 10 and 12-14** are rejected under 35 U.S.C. 102(e) as being anticipated by **Bidnyk (US 2002/0191887 A1)**. Bidnyk teaches a arrayed waveguide grating device (Fig. 1) using planar lightwave circuit technology (paragraph 0039) that is either used for multiplexing and/or demultiplexing functions (paragraph 0038) comprising input waveguides (108), a waveguide array (116), an output slab waveguide

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(114) coupled to a pair of output waveguides (150, 152) which are coupled to a directional coupler (160) (paragraph 0039).

3. **Claims 1-2, 6-8, 10-12, 14, 22 and 27** are rejected under 35 U.S.C. 102(e) as being anticipated by **Naruse (US 2003/0103722 A1)**. Naruse teaches a arrayed waveguide grating device (Fig. 2) that is used as a multiplexer when light propagates in the opposite direction of the arrow shown in Fig. 2 (paragraph 0058) using planar lightwave circuit technology (paragraph 0004) comprising input waveguides (6, labeled as output when light is propagated in the demultiplexing way), a waveguide array (4), an output slab waveguide (3, when light is propagated in the demultiplexing way) coupled to a pair of output waveguides (Fig. 1B, 21b, 21c) which are coupled to a directional coupler (Fig. 1A, 21) that create a flat spectral response at the output (Fig. 3B, paragraphs 0068-0069).

4. **Claims 22, 26 and 28** are rejected under 35 U.S.C. 102(e) as being anticipated by **Laming et al (US 2004/0047560 A1)** (Laming). Laming teaches an arrayed waveguide grating device (Figs. 3-4) on a substrate (22) (which implies it is a planar lightwave circuit) comprising an input and output waveguide coupler (31), waveguide pairs (a, b, c, d) having different spacing (and therefore lengths as seen in Fig. 4) to achieve a flat spectral output (paragraphs 0027-0028) coupled to the waveguide coupler (31).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claim 29** is rejected under 35 U.S.C. 103(a) as being unpatentable over obvious over **Doerr et al (US 6,236,781 B1)** and the knowledge of one of ordinary skill in the art at the time of the invention.

Doerr teaches a method and an AWG apparatus (Fig. 3) comprising a waveguide array (306), an output slab waveguide (free space region 308) coupled to first and second output waveguides (310₁, 310₂) coupled to multi-mode interference (MMI) coupler (312) (column 3 lines 64-65) where the MMI coupler (312) is coupled to the slab waveguide (308) via waveguides (310₁, 310₂) and where a third and fourth output waveguide is coupled to another MMI coupler (not shown, claim 6) for filtering a signal using the AWG (column 4 lines 66-67 through column 5 lines 1-6) and adjusting (in this case reducing) the spacing between successive waveguides to generate a flat spectral output wave form (column 4 lines 5-13).

Doerr does not teach expressly that the channel spacing between the coupling pairs is greater than the channel difference between the two waveguides in each pair.

Doerr does teach adjusting (in this case reducing) the spacing between successive waveguides to generate a flat spectral output waveform (column 4 lines 5-13).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art as it was an ordinary practice in the art to adjust channel spacing in AWG waveguides to achieve flat spectral outputs as is taught by Doerr

The motivation for doing so would have been to increase efficiency and an integrity of the optical signal by eliminating excess loss by ensuring the signal is not radiated out or lost (Doerr, column 2 lines 15-19).

See additional comments regarding this rejection in the response to arguments section.

Allowable Subject Matter

6. **Claim 17-21 and 33** are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

With regard to claims 17 and 33: These claims are allowable over the prior art of record because the latter, either alone or in combination, does not disclose nor render obvious output waveguide pairs at the end of output slab waveguide of a arrayed waveguide structure with the spacing relationship stated in claim 17 or that the primary channel spacing between two of the same output waveguides coupled to a multi-mode interference coupler is less than a secondary channel spacing between the first

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waveguide and an additional third waveguide coupled to a separate coupler, in combination with the rest of the claimed limitations.

With regard to claims 18-21: These claims are allowable over the prior art of record because they depend on allowable claim 17.

7. **Claims 3-5, 9, 15-16, 23-25 and 32** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

These claims would be allowable over the prior art of record if rewritten in independent form including all of the limitations of the base claim and any intervening claims because the latter, either alone or in combination, does not disclose nor render obvious two output waveguides coupled to an output slab waveguide of an arrayed grating device with the output waveguides having primary channel spacing different than the secondary spacing between the first waveguides coupled to adjacent couplers or the spacing relationship giving in claims 5, 9 and 23, in combination with the rest of the claimed limitations.

Response to Arguments

8. Applicant's arguments, filed 25 March 2005, with respect to claims rejected by the Li, Doerr and Nishimura references have been fully considered and are persuasive. The rejections of claims 1-2, 6, 8, 10-14, 17, 29-30 and 33-34 based on these reference has been withdrawn. Li and Nishimura fail to teach two output waveguides from the

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slab waveguide coupled to the directional coupler, instead Li and Nishimura teach one output waveguide coupled to the coupler together with another waveguide that is not coupled to the slab waveguide. Doerr teaches a multi-mode interference coupler which is not obvious over or suggests a directional coupler.

9. Applicant's arguments regarding the He have been fully considered but they are not persuasive. He does teach in the abstract that the waveguide lengths are optimize to create a flat spectral response. He teaches the distance from the arrayed waveguides from the first coupler is optimized to create a channel frequency response having a flat top and steep edge. The claim language of claim 22 only calls for an input and output coupler (taken as the first coupler of He) and a waveguide pair coupled to the coupler with different lengths (He shows waveguide pairs with the same lengths).

10. Applicant's arguments regarding the Doerr 103(a) rejection of claim 31 have been fully considered but they are not persuasive (Doerr does not teach the secondary spacing greater than the primary spacing so the rejection of claim 32 is removed). A prima facie rejection can be made with the combination of a single reference and what is ordinary skill in the art, as was done in this rejection. Doerr does teach adjusting (in this case reducing) the spacing between successive waveguides to generate a flat spectral output waveform (column 4 lines 5-13), and since two successive waveguide are coupled in a pair, Doerr implies that the channel spacing between this pair is going to be different than the channel spacing of the next two pairs since Doerr teaches

reducing the spacing in successive waveguides. It would have been obvious to one of ordinary skill in the art, with the teachings of Doerr and the knowledge of one of ordinary skill that limitations of claim 31 are met.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following reference should be made part of the record as teaching the state of the prior art at the time of the invention: Takiguchi et al (US 2001/0010739 A1), Dragone (US 5,136,671) (US 5,412,744) (US 5,467,418) (US 6,574,396), Li (US 5,706,377), Akiba et al (US 5,841,919), Bulthuis et al (US 6,289,147 B1), Oguma et al (US 2002/0015554 A1), Zhao et al (US 6,556,746 B1), Tabuchi et al (US 2003/0081898 A1), Dingel (US 2003/0133655 A1) (US 6,597,841 B1), Oguma et al (US 6,606,433 B2), Doerr (US 6,728,446 B2), Lee et al (US 6,807,372 B1).

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan Lepisto whose telephone number is (571) 272-1946. The examiner can normally be reached on M-F 7:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ryan Lepisto

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Date: 4/6/05



Frank Font

Supervisory Patent Examiner

Technology Center 2800